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ABSTRACT

Microteaching, or peer teaching, is an activity that requires science methods students to plan, teach, and evaluate a particular lesson. The peer teaching activity, although obviously similar to teaching a lesson in a traditional classroom, enables the methods students to teach to a small group of their peers, thus easily receiving constructive criticism of the lesson taught. This paper describes preparation for peer teaching, deciding on the type of lesson and evaluation forms to use, self-assessment, and the post-peer teaching interview. The importance to the peer teacher of communication skills is stressed, and the teaching strategies that have proven most successful, namely, the Illustrated Talk, the Inquiry lesson, and the Process Skills lesson are described. The following five appendixes are included: (1) Communication Skills Performance Checklist; (2) Illustrated Talk Performance Checklist; (3) Inquiry Lesson Performance Checklist; (4) Process Skill Lesson Performance Checklist; and (5) Student Feedback Form. (PR)

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MICROTEACHING: AN INTEGRAL PART OF A SCIENCE METHODS CLASS

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Microteaching: An Integral Part of a Science Methods Class

Introduction

The microteaching, or peer teaching, experience is an activity that requires science methods students to plan, teach, and evaluate a particular lesson. The peer teaching activity, although obviously similar to teaching a lesson in a traditional classroom, enables the methods students to teach to a small group of their peers thus easily receiving constructive criticism to the lesson taught. Not only does the "teacher" receive feedback from the methods instructor and the "students" he/she also has a video tape of the lesson for self evaluation. As Collette and Chiappetta (1989) contend, "The feedback to presenters is a major element in the training process. It should be given as soon after the presentation as possible, and objectivity is essential. In order to be objective, the feedback must be based on the skills, strategies, techniques, teaching aids, and so on . . . as being essential to a good science lesson presentation." (p. 347 - 348). As one can thus imagine, much preparation must go into both organizing the peer teaching experiences but also in developing the feedback forms.

Preparation for Peer Teaching

The methods instructor must decide not only what type of a lesson will be "taught" but also the length of a lesson. The instructor might decide that a 10 minute lesson, focusing on a specific skill or technique might be appropriate or a longer teaching episode focusing on a combination of skills or techniques might be more effective. It is also conceivable that, time and materials permitting, that an entire 40 - 45 minute lesson might be desirable. As one can imagine, the more methods students in class, the longer time frame needed for the peer teaching experiences.

Once the type and length of lesson to be taught is decided upon the next obvious step in the process is to discuss with the students the responsibilities of the "teacher" and "students" and the types of evaluation forms to be used and how they are to be completed. Everyone involved with the microteaching experience must be well aware that it is an artificial teaching situation and certain protocol must be followed to the insure the activity is successful. It will be difficult for the student who is teaching the lesson to teach it as though he/she were presenting it to a middle or high school class but for the experience to be successful the lesson must be presented in just this way. Also, it will be difficult for the methods students to receive the lesson as a middle or high school student would but, again, for the experience to be successful they must react in this way. The "students" are encouraged to ask questions as a middle/high school might but to also once in a while incorrectly answer questions the "teacher" might ask so as to evaluate how he/she reacts to an incorrect answer. Once the methods class understands that the success of the peer teaching episodes depends upon their acting out the roles of high school teacher and students they are usually very good at it.

Another factor that is difficult for the methods students is to honestly evaluate their peers as to the effectiveness of their teaching. As one can surmise, many students don't want to "hurt the feelings" of their friends." As with the protocol for being middle/high school "teachers" and "students" each member of the methods class must understand that the success of the peer teaching evaluation depends upon an honest evaluation.

Also of concern to the peer teacher is the presence of the camcorder that is used to record the lesson being taught. The best advice to the students is to try and ignore the camcorder (not really an easy feat) and just remember that it is used to record the lesson and provide a means for the "teacher" to self-evaluate the lesson.

It might also be a good idea to put together a "Peer Teaching Packet" which contains the rationale for the activity, teacher directions, student directions, strategy for preparing and teaching a lesson, directions for completing the written critique, a scoring map on how you will evaluate the critique, and maybe a cover sheet to be attached to the critique when it is handed in.

Type of Lesson and Evaluation Forms

There are many teaching strategies that are very successful in science. Since most general methods classes also have a microteaching component may generally concentrate on lecture-type lessons, our science methods classes concentrate on the teaching methods that tend to involve hands-on or interactive lessons. The ones proven to be most interesting and successful are the Illustrated Talk (also called demonstrations), Inquiry, and Process Skills lessons.

Communication Skills: Before concentrating on specific lessons, the peer teacher must exhibit sound communication skills. The first evaluation form, Appendix A is a form to rate the peer teacher's skills in verbal, non verbal, composite, and question asking. This form is filled out by the methods instructor either during the course of the lesson, directly after the lesson is completed, or while viewing the video tape of the lesson. The instructor may decide that filling out any of the forms during the course of a lesson may be distracting, evening somewhat threatening, to the peer teacher and that there is just not enough time directly after the lesson to accurately complete the forms. In this case, viewing the video tape with or without the student present may be the best method. In any case, the communication skills evaluation sheet concentrates on the "teachers" behaviors while teaching the lesson rather than the lesson content. Most students have no concept at all on their behaviors while teaching and are really shocked to see their weaknesses evaluated on the form and/or to view them on the video tape.

Illustrated Talk: This type of lesson combines the lecture teaching strategy with the typical science demonstration. The peer teacher should present a lesson where he/she presents information to the

students by a liberal use of discussion (lecture?), demonstration materials and visual aids when appropriate. As can be seen by the form in Appendix B, it is important to have a good, attention-grabbing lesson opening and then the body of the lesson should proceed with the teacher asking questions of the students and having them actually control the lesson. Questions such as, "Why do you think that happened?", "What do you think we should do next?", "What do you think that happened?", etc. will actually make the lecture/demonstration interactive with the students. The teacher is almost acting as a facilitator and the students are supplying the information needed to continue with the illustrated talk. The lesson ending is also important in that the teacher use the results of the lesson to synthesize what has been learned.

Inquiry Lesson: An inquiry lesson is one where the students investigate and find answers by themselves. The evaluation form, Appendix C, is similar to the Illustrated Talk form in that it requires the peer teacher to present an informative lesson opening, body of the lesson, and lesson ending. The criteria to be evaluated obviously is centered around the students doing some type of investigation to find the answers to a problem or an experiment. As in the Illustrated talk the teacher acts as a facilitator rather than a disseminator of information but even more so. The lesson body portion of the evaluation form has a section devoted to how the students react to the lesson as far as individualized or group learning is concerned since the basis of an inquiry lesson is having the students react and learn on their own. The main difficulty with peer teaching this type of lesson is that the "students" usually know full well the answer to the inquiry problem presented by the "teacher" and find it laborious to go through the inquiry process to find an answer they already know.

Process Skill Lesson: This type of lesson emphasizes the elementary process skills such as observing, classifying, measuring, communicating and the more complex skills such as hypothesizing, predicting, inferring, and experimenting. As the other evaluation forms this form, Appendix D, emphasizes the lesson opening, body, and ending but overall it concentrates on the steps in the Tobin and Capie Process Skill Instruction Model. This type of lesson has been one of the most successful ones taught by the peer teacher and reacted to by the "students." It is a very exciting and interactive way to teach and learn especially since the students must generate a hypothesis, set the independent and dependent variables, gather data, and display and analyze the data. This can be a very time consuming lesson especially if the "students" discuss numerous way to set and control variables so it has been a good idea in the past to make sure the peer teacher has a set of data available so the students can "collect" this data rather than actually do the investigation and collect the data on their own. This form is very easy to complete during the lesson itself since all the instructor must do is check off each step as it occurs in the lesson.

Student Feedback Form: The student feedback form, Appendix E, is filled out by the "students" and given to the peer teacher at the conclusion of the lesson. As mentioned previously, it is very important for the methods students acting as middle/high school students to honestly and objectively evaluate the peer teacher as to the strengths and weaknesses of the lesson. Make sure that the "students" do not attempt to fill out the forms during the lesson, as they should be reacting as students, but rather after the lesson has been completed.

Self Assessment

At the conclusion of the lesson the peer teacher now has four sources upon which to base his/her evaluation of the lesson. The first source is the Communications Skills evaluation form filled out by the instructor, the second source is the specific lesson evaluation form also filled out by the instructor, the third source is the student evaluation forms, and the fourth source is the video tape of the lesson. Many times it helps the peer teacher to evaluate the lesson if the instructor includes written comments on the lesson written on the sides or back of the evaluation forms.

The peer teacher will now review all the evaluation forms, view the video tape and write a critique of the lesson. The critique should include a summary of the strengths of the lesson, the weaknesses of the lesson, and any changes that should be made to the lesson. Any statements or assertions of strengths or weaknesses should be warranted assertions, that is statements or assertions backed up by a citation. It is not acceptable to simply say, "I made good use of voice inflection" but rather an assertion should be made such as, "According to 8 of 10 student evaluation forms, I made good use of voice inflection and when I viewed the video tape, I agree with their evaluations." This is more difficult and time consuming for the students but it makes for a much more valid critique.

Post Peer Teaching Interview

It is a good idea to meet with each student after the microteaching activity is completed and discuss the written critique. Many students have difficulty expressing themselves by writing and a verbal discussion may be very rewarding.

REFERENCES

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APPENDICES

APPENDIX A

Communication Skills
Performance Checklist

APPENDIX B

Illustrated Talk
Performance Checklist

APPENDIX C

Inquiry Lesson
Performance Checklist

APPENDIX D

Process Skill Lesson
Performance Checklist

APPENDIX E

Student Feedback Form

ED 324 - Dr. Pauline
Communication Skills
Performance Checklist

Peer Teachers Name _____
Lesson Topic _____
Date _____

Code: 0 = None 1 = Poor 2 = Fair 3 = Good 4 = Excellent NA = Not Applicable

1. Simple Verbal Behaviors:

The teacher displayed . . .
_____ a. control of slang and jargon.
_____ b. clear enunciation.
_____ c. smoothness of verbal delivery.
_____ d. use of clear and simple English.
_____ e. use of transitional phrases/sentences.
_____ f. good volume and tone.
_____ g. use of voice inflection.

2. Non-verbal behaviors:

The teacher displayed . . .
_____ a. enhancing body position and motion.
_____ b. a high degree of eye contact with students.
_____ c. appropriate dress/appearance.
_____ d. enhancing facial expressions.
_____ e. enhancing hand gestures.

3. Composite behaviors:

The teacher displayed . . .
_____ a. an awareness of student's needs.
_____ b. a high degree of enthusiasm.
_____ c. confidence, poise.
_____ d. rapport with students.
_____ e. responsiveness to student needs/questions.
_____ f. an understanding of lesson material.
_____ g. supportive use of instructional aids.
_____ h. non-distractive use of notes.
_____ i. good use of time.
_____ j. appropriate pacing of lesson.

4. Question asking behaviors:

The teacher . . .
_____ a. asked clear questions.
_____ b. asked questions before calling on students.
_____ c. used wait-time after asking a question.
_____ d. used wait-time after a students' response.
_____ e. reacted appropriately to student responses.
_____ f. ordered questions in an appropriate sequence.
_____ g. distributed questions across the class.
_____ h. used probing questions where appropriate.
_____ i. asked questions whenever possible.
_____ j. used an appropriate percentage of high- and low-level questions.

ED 324 - Dr. Pauline
Illustrated Talk
Performance Checklist

Peer Teachers Name _____
Lesson Topic _____
Date _____

Code: 0 = None 1 = Poor 2 = Fair 3 = Good 4 = Excellent NA = Not Applicable

I. Lesson Opening:

The teacher . . .

_____ a. captured the students' attention.
_____ b. eluded to the lesson's performance objective(s) without giving away the concept.
_____ c. tied the lesson to past and/or future lesson(s).*

II. Lesson Body:

The teacher . . .

_____ a. set the stage for the demonstration.
_____ b. had all the materials and equipment ready for use.
_____ c. set up the demonstration where it could be easily viewed by the students.
_____ d. performed the demonstration with ease.
_____ e. performed the demonstration such that exemplar characteristics of the concept(s) were emphasized.
_____ f. encouraged students to make statements which defined and/or explained the concept(s).
_____ g. used visual aids where appropriate to support the demonstration.
_____ h. used questions to help students develop an understanding of the concept(s).
_____ i. defined terms or gave background information only when necessary.
_____ j. developed the practical relevance of the concept(s).*
_____ k. maintained an inductive organization to the lesson.

III. Lesson Ending:

The teacher . . .

_____ a. noted the lesson's ending/closure to students.
_____ b. summarized the lesson.
_____ c. assessed students' comprehension of the concept(s).
_____ d. assessed student's ability to apply the concept (new situations).
_____ e. tied the lesson to past and/or future lesson(s).*
_____ f. developed the practical relevance of the concept(s).*
_____ g. made relevant and clear homework assignments and/or announcements.
_____ h. allowed sufficient time for the lesson ending.

*May be dealt with elsewhere.

ED 324 - Dr. Pauline
Inquiry Lesson
Performance Checklist

Peer Teachers Name _____
Lesson Topic _____
Date _____

Code: 0 = None 1 = Poor 2 = Fair 3 = Good 4 = Excellent NA = Not Applicable

I. Lesson Opening:

The teacher . . .

_____ a. captured the students' attention.
_____ b. eluded to the lesson's performance objective(s) without giving away the concept(s).
_____ c. tied the lesson to past and/or future lesson(s).*
_____ d. had a smooth transition into the inquiry lesson.

II. Lesson Body:

The teacher . . .

_____ a. set the stage for the investigation.
_____ b. had all the equipment and materials ready for use.
_____ c. defined terms or gave background information only when necessary.
_____ d. used questions to help students develop an understanding of the investigation.
_____ e. maintained an inductive organization to the lesson.
_____ f. developed a practical relevance of the concept(s).*
_____ g. used visual aids where appropriate to support the investigation.

The students . . .

_____ h. appeared to be restructuring their previous learning experiences.
_____ i. used other students as resource persons.
_____ j. had no structured outline to follow.

III. Lesson Ending:

The teacher . . .

_____ a. noted the lesson's ending/closure to the students.
_____ b. summarized the investigation.
_____ c. assessed students' comprehension of the concept(s).
_____ d. tied the lesson to past and/or future lessons.*
_____ e. made relevant and clear homework assignment and/or announcements.
_____ f. allowed sufficient time for the lesson ending.

*May be dealt with elsewhere.

ED 324 - Dr. Pauline
Process Skill Lesson
Performance Checklist

Peer Teachers Name _____
Lesson Topic _____
Date _____

Code: 0 = None 1 = Poor 2 = Fair 3 = Good 4 = Excellent NA = Not Applicable

I. Lesson Opening:

The teacher . . .
_____ a. Captured the students attention.
_____ b. stated well-formed performance objective(s).
_____ c. tied the lesson to past and or future lesson(s).*

II. Lesson Body:

The Teacher . . .
_____ a. taught to the lesson's objective(s).
_____ b. sequentially developed the steps in the model.
_____ c. fully developed each step in the model.
_____ d. acted as a lesson facilitator.
_____ e. used "good" question asking behavior/skills.
_____ f. kept students involved in the lesson.
_____ g. had all instructional materials ready.
_____ h. used "proper" presentation skills.

III. Lesson Ending:

The Teacher . . .
_____ a. noted the lesson's ending/closure to students.
_____ b. summarized the lesson.
_____ c. assessed students against the objective(s) which was/were taught.
_____ d. made relevant and clear homework assignment(s).

Steps in the Tobin and Capie Process Skill Instruction Model:
___ 1. State the problem.
___ 2. Identify the dependent variable in the investigation.
___ 3. Identify procedures for measuring the dependent variable in the investigation.
___ 4. Identify variables that may affect the dependent variable in the investigation.
___ 5. State hypotheses that can be tested in the investigation and a rationale for each.
___ 6. State a hypothesis that can be tested.
___ 7. Identify the independent variable to be manipulated in the investigation.
___ 8. Identify procedures for measuring the independent variable in the investigation.
___ 9. Identify procedures for manipulating the independent variable.
___ 10. Identify the variables to be held constant in the investigation.
___ 11. Identify procedures for holding variables constant in the investigation.
___ 12. Overviewed the experimental procedures.
___ 13. Gather data to test the hypothesis.
___ 14. Record data in an appropriate table.
___ 15. Select a suitable scale to graph the data.
___ 16. Plot the data.
___ 17. Interpolate and extrapolate from the graph.
___ 18. Decide whether the data supports the hypothesis.
___ 19. Modify the hypothesis to be consistent with the data collected.

Student Feedback Form

Peer Teacher _____ Date _____

Lesson Topic _____

1. What were the objectives of the lesson as you understood them?

2. What did the teacher do especially well?

3. What did the teacher do that was not helpful?

4. How might the teacher improve this lesson?

5. Do you think a middle/high school class would receive this lesson positively? Why or why not?

6. Rate this lesson by checking the appropriate spot on the line below.

_____

Excellent Good Fair Poor

PLEASE PUT ANY ADDITIONAL COMMENTS ON BACK